

Multiple Linear Regression

Technical Definition:

Multiple Linear Regression is a statistical method used in machine learning to predict a dependent variable (target) based on multiple independent variables (features). It aims to find the best-fitting linear relationship between the predictors and the target variable by minimizing the difference between observed and predicted values.

Simple Explanation:

Imagine we are trying to figure out price of house based on area of house, numbers of bedrooms and age. These factors can affect the price of house. Multiple Linear Regression helps us understand this by finding patterns and relationships between these factors.

Step-by-Step Explanation:

1. In our example, the dependent variable is price of house, while the independent variables are bed rooms and age of the house (in years).
2. Data Collection: Gather data for our model from various sources and methods. For our understanding we can consider following data set.

Area (sq. ft.)	Bedrooms	Age (years)	Price (INR)
1500	2	10	15,00,000
2000	3	5	20,00,000
1800	3	8	17,50,000
2200	4	3	22,50,000
1600	2	15	18,00,000
1900	3	6	19,00,000
2100	4	2	21,00,000
1700	2	12	17,00,000
2300	4	4	23,70,000

3. Best-Fitting Line: Multiple Linear Regression finds the best-fitting line that represents the relationship between these features and the target variable. It's like drawing the best line through a scatter plot of data points to predict price.

We will use regression with multiple variables here. Price can be calculated using following equation,

$$\text{price} = m_1 * \text{area} + m_2 * \text{bedrooms} + m_3 * \text{age} + b$$

$$y = m_1 x_1 + m_2 x_2 + m_3 x_3 + b$$

4. **Minimizing the Difference:** The goal is to minimize the difference between the actual price of house and predicted price of house by our equation. We adjust the equation until it gives us the closest predictions to the real values.

To put it simply, Multiple Linear Regression is a tool that helps us understand how different factors affect something we want to predict. It's like finding the perfect recipe to predict outcomes based on various ingredients.

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